NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE SPECIFICATIONS

FENCE

(Feet)
CODE 382

SPECIFICATIONS APPLICABLE TO FENCE 382:

Application of Fence 382, shall adhere to the Wyoming NRCS Conservation Practice Standard in the Field Office Technical Guide.

- A treatment plan shall include the following information:
  1. Describe the requirements for application of the practice to achieve its intended purpose. Standard drawings and specifications shall be utilized to the extent they fully describe the required installation. Installations departing from available standard drawings and specifications will require the preparation of drawings and specifications on an individual basis.
  2. Location - Field Numbers, and Map or Sketch of fence location.
  3. Length and how determined.
  4. Date practice applied.
  5. Type
  6. Height
  7. Purpose
  8. Other useful comments.
  9. Date and signature.

- All materials used in construction shall be new, unless otherwise stated.

- Suitable design specifications are also included in: FENCES, July, 1988, publication 2400-Range.

- Special designs may be needed for game farms, wildlife migration routes or areas where people must be controlled. Such designs will be developed on a case-by-case basis and submitted to the State Resource Conservationist for approval.

- The use of fencing for catchment to augment water supplies is outside the scope of this practice unless such a purpose is a supplement to animal management purposes (See "Snow Harvesting" (727) Conservation Practice Standard, Section IV, FOTG).

- WIRE SPACING: Some suggested wire spacing measurements are as follows: (for power fences "+" equals hot wire and "-" equals ground wire).

For cattle only:	2 wire = 28(-), 32(+);
	3 wire = 16(+), 26(-), 38(+);
	4 wire = 10(-), 20(+), 30(-), 42(+) or
	8(-), 18(+), 28(-), 40(+) or
	16(-), 20(+), 30(-) 42(+).
For sheep only:	4 wire = 10(-), 16(+), 24(-), 32(+).
For cattle & sheep:	5 wire = 10(+), 16(-), 24(+), 32(-), 44(+).

LINE POSTS:

All wooden posts except pitch pine, juniper, red cedar & osage orange shall, as a minimum, be butt-treated with an approved EPA method such that complete penetration of the sapwood shall be obtained. Treatment shall extend up the post a minimum of the burial depth in the soil specified for the type of fence being constructed.

All steel posts shall have a minimum weight of 1.33 pounds per foot of length exclusive of anchor plate. They shall have suitable means for supporting fencing such as studs, grooves, etc. Posts with lugs or lips that are punched out of the post itself shall not be used. All steel posts shall have a suitable anchor plate securely fastened near the bottom.

Railroad ties or telephone poles that are sound, free from decay, and have not previously been used as fencing material, may be used, so long as minimum diameter and length requirements are met for the type of fence to be constructed.

LENGTH of line posts shall be as needed, for height of fence plus depth in soil. For other size specifications of line posts, see specific additional specifications.

CORNER, GATE & BRACE POSTS:

Same as line posts except steel posts shall weigh a minimum of 2.84 pounds per foot of length.

LENGTH of corner, gate & brace posts shall be as needed for height of fence plus depth in soil.

For other size specifications of corner, gate & brace posts, see specific additional specifications.

BRACES:

Same as line posts but also includes three (3) inch by four (4) inch sawed timber and two (2) inch galvanized steel pipe. Steel posts shall be grooved and without anchor plates. Jacklegs are not applicable for braces.

WIRE:

Barbed wire shall be either zinc or aluminum coated with a minimum double strand strength of 950 pounds. All wire shall be malleable enough so that proper splices can be made without damage to wire or coating. Barbs shall be spaced not more than 5 inches and shall be of 14 gauge or heavier wire with at least two points. All barbed wire shall consist of two strands of wire.

Barbless wire shall meet or exceed the requirements established herein for barbed wire except those covering barbs.

Smooth wire, single strand, used for brace wiring shall be zinc or aluminum coated and not less than 14 gauge.

WIRE STAPLES, CLIPS & FASTENERS:

Wire staples shall be serrated and a minimum of one and one-half (1.5) inches in length except three-fourths (3/4) inch length may be used for hardwood such as osage orange. The minimum diameter of staples shall be nine (9) gauge. One legged, serrated staples may be used in wood posts in place of standard staples. In wood posts, staples shall be driven diagonally with the wood grain.

Wire clips or fasteners for steel posts or serrated staples made for the particular style steel post may be used. For grooved steel posts, serrated staples will be driven into the groove according to the manufacturer's recommendations. Space shall be left between the staple and post to permit movement of the wire.

Any suitable fastener that is fourteen (14) gauge minimum, showing good workmanship, that holds the wire at the proper height and allows the wire to freely contract and expand may be substituted for special clips, but shall not be used in lieu of serrated staples when staples are recommended by the manufacturer.

GATES:

Wire gates shall conform to the kinds, grades, and sizes specified for new fence and shall include the necessary fittings and stays.

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Timber gates shall be constructed of 2 inch or larger dimensional lumber.

Commercial gates shall be of durable material and installed in accordance with the manufacturer's recommendations.

Fabricated metal gates shall be constructed of material of a quality equivalent to and with a life expectancy of the rest of fencing material.

ANCHORING:

In crossing narrow drainageways or draws, a weight or deadman anchor equivalent to a 12 inch X 12 inch X 12 inch concrete block shall be fastened to the fence wires by suspension wire or wires. This will be done in a manner that will result in maintaining wire spacing and clearances approximately the same as that of the rest of the fence. (Not applicable to snow fence or buck & pole fence.)

BRACING AND ALIGNMENT:

Bracing is required at all corners, gates, direction change angles, and steep vertical angles in the line. In addition, line bracing is required at intervals to facilitate wire stretching. Maximum distance between brace panels in the fence line shall not exceed eighty (80) rods on level terrain and shall be installed at lesser intervals wherever horizontal direction of the fence changes more than fifteen (15) degrees or where vertical angles cause excessive strain on fasteners and posts. Line brace panel and angle or corner bracing shall be designed to provide solid anchorage for wire stretching. All corner and direction change braces shall be braced in both directions of the fence. For standard "H-type" braces, a tension member will be incorporated in all brace panels. This will be composed of four (4) complete loops of number fourteen (14) gauge smooth wire or its equivalent cross sectional area in heavier gauge wire, either smooth or barbed. This tension wire shall extend from a point approximately equal to the top wire of the fence, but at least one inch below the top of the brace post, to near, but not below the ground level of the post being braced. The brace wire shall be twisted to provide needed rigidity. ALL STANDARD "H" BRACE PANELS SHALL, AS A MINIMUM, MAINTAIN A TWO TO ONE RATIO OF BRACE LENGTH TO HEIGHT OF THE TOP WIRE. Other suitable designs are included in "FENCES, July, 1988, publication 2400-Range". The responsible technician may approve special designs utilizing steel posts. (Not applicable to Buck & Pole Fence.)

STAYS: See specific additional specifications.

HEIGHT OF FENCE:

Minimum height of thirty two (32) inches except for snow fence and combination snow/standard fence. The top wire shall be at least three (3) inches from the top of wooden posts and at least one (1) inch from the top of steel, self insulating hardwoods or fiberglass posts.

WIRE SPACING:

See specific additional specifications for power fences or "considerations" for other types of fence.

Additional Specifications Applicable For 3, 4, or 5 strand barbed or barbless wire Suspension Fence including Suspension letdown.

LINE POSTS:

DIAMETER:

Regular wood posts shall be a minimum nominal diameter of four (4) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of two and a half (2.5) inches inside the bark.

Steel posts shall conform to the general specifications for "Line posts, type".

DEPTH IN SOIL:

Depth of line posts in medium to heavy textured soils shall be a minimum of twenty four (24) inches except for steel posts which shall be a minimum of eighteen (18) inches.

Depth of line posts in sandy or gravelly textured soils shall be a minimum of thirty (30) inches except for steel posts which shall be a minimum of twenty four (24) inches.

MAXIMUM SPACING:

Maximum spacing between line posts shall be one hundred and twenty (120) feet.

CORNER, GATE & BRACE POSTS:

DIAMETER:

Regular wood posts shall be a minimum nominal diameter of eight (8) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of five (5) inches inside the bark.

Steel posts shall conform to the general specifications for "Corner, Gate & Brace posts, type".

DEPTH IN SOIL:

Depth of posts in soils shall be a minimum of thirty six (36) inches.

MAXIMUM SPACING:

Maximum spacing between brace posts shall be twelve (12) feet.

STAYS:

Stays for wire fences shall be of wire especially fabricated for this purpose and swing free of the ground to permit the fence to sway when contacted by animals. Wood stays used for Let-Down Fence shall be durable and a minimum of two and a half (2.5) inches in diameter.

Spacing for stays shall be approximately fifteen (15) feet but no more than a maximum of twenty (20) feet.

LET-DOWN SUSPENSION FENCE:

Let-down fences shall be designed and constructed according to USDA-NRCS, standard drawings or according to "FENCES, July, 1988, 2400-Range".

Additional Specifications Applicable For 3,4, or 5 strand barbed or barbless Standard Fence including Standard letdown.

LINE POSTS:

DIAMETER:

Regular wood posts shall be a minimum nominal diameter of three and a half (3.5) inches inside the bark. Wood posts used for jacklegs shall be a minimum nominal diameter of five (5) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of two (2) inches inside the bark.

Steel posts shall conform to the general specifications for "Line posts, type".

DEPTH IN SOIL:

Depth of line posts in medium to heavy textured soils shall be a minimum of twenty four (24) inches except for steel posts which shall be a minimum of eighteen (18) inches.

Depth of line posts in sandy or gravelly textured soils shall be a minimum of thirty (30) inches except for steel posts which shall be a minimum of twenty four (24) inches.

MAXIMUM SPACING:
Maximum spacing between line posts shall be twenty (20) feet.

CORNER, GATE & BRACE POSTS:

DIAMETER:
Regular wood posts shall be a minimum nominal diameter of five (5) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of four (4) inches inside the bark.

Steel posts shall conform to the general specifications for "Corner, Gate & Brace posts, type".

DEPTH IN SOIL:
Depth of posts in soils shall be a minimum of thirty (30) inches.

MAXIMUM SPACING:
Maximum spacing between brace posts shall be twelve (12) feet.

STAYS:
Stays for wire fences shall be of wire especially fabricated for this purpose and swing free of the ground to permit the fence to sway when contacted by animals. Wood stays used for Let-Down Fences shall be durable and a minimum of two and a half (2.5) inches in diameter.

Spacing for stays shall be as needed for site condition and fence duty.

LET-DOWN STANDARD FENCE:
Let-down fences shall be designed and constructed according to USDA-NRCS, standard drawings or according to "FENCES, July, 1988, 2400-Range".

JACKLEGS:
Jacklegs for standard fence shall be designed and constructed according to USDA standard drawings or according to "FENCES, July, 1988, 2400-Range" as needed for site condition and fence duty.

Additional Specifications Applicable For 3,4, or 5 strand barbless Permanent Power Fence.
Two wire permanent power fence may be used for intensive "prescribed grazing" systems when approved, in writing, by the responsible Team or State Range Management Specialist.

WIRE SPACING:
In all cases where the movement of antelope is a concern, the bottom wire of power fences shall be a smooth ground wire with subsequent wires being alternately charged. If this bottom wire is less than sixteen inches (16), the second wire shall be sixteen inches (16) or higher above ground.

LINE POSTS:

TYPE:
In addition to line post types in general specifications, fiberglass posts made of a composite of marble, fiberglass, and polymer resins which have been treated by thermosetting, or extremely dense hardwood posts that are self insulating may be used.

DIAMETER:
Regular wood posts shall be a minimum nominal diameter of three and a half (3.5) inches inside the bark. Wood posts used for jacklegs shall be minimum nominal diameter of five (5) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of two and a half (2.5) inches inside the bark.

Steel posts shall conform to the general specifications for "Line posts, type".

Fiberglass posts may be "T"-shaped with a minimum of 1.25 X 1.25 inches cross section with notches on two (2) inch spacings or round posts with a minimum diameter of three quarter (3/4) inch.

Self insulating hardwood posts shall be a minimum of one and a half (1.5) by one and a half (1.5) inches cross section.

DEPTH IN SOIL:

Depth of line posts in medium to heavy textured soils shall be a minimum of twenty four (24) inches except for steel or fiberglass posts which shall be a minimum of eighteen (18) inches.

Depth of line posts in sandy or gravelly textured soils shall be a minimum of thirty (30) inches except for steel or fiberglass posts, which shall be a minimum of twenty four (24) inches.

MAXIMUM SPACING:

Maximum spacing between wood line posts shall be one hundred feet with stays on fifty (50) foot centers or seventy five (75) feet without stays.

CORNER, GATE & BRACE POSTS:

DIAMETER:

Regular wood posts shall be a minimum nominal diameter of six (6) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of five (5) inches inside the bark.

Steel posts shall conform to the general specifications for "Corner, Gate & Brace posts, type".

DEPTH IN SOIL:

Depth of posts in soils shall be a minimum of thirty six (36) inches.

MAXIMUM SPACING:

Maximum spacing between brace posts shall be twelve (12) feet.

BRACING:

Pull posts or pull post assemblies shall be spaced no more than one-half (1/2) mile apart.

STAYS:

Stays for permanent power fences shall be of self insulating hardwood one and a half (1.5) by one (1) inch cross section or fiberglass meeting the specifications for "line posts, type", except for length, and swing free of the ground to permit the fence to sway when contacted by animals.

Spacing for stays shall be approximately fifty (50) feet maximum.

JACKLEGS:

Jacklegs shall be designed and constructed according to USDA standard drawings or according to "FENCES, July, 1988, 2400-Range" as needed for site condition and fence duty.

ELECTRICAL GROUNDING:

All power fences must be properly grounded as per the manufacturer's recommendation. Inadequate grounding is the leading cause of power fences' failure to control livestock.

ENERGIZERS: Electronic energizers or power-fence controllers shall be UL (Underwriters Laboratory) listed. Installation shall be according to manufacturer's recommendations. The maximum length of wire per controller shall not exceed manufacturer's recommendation for size and type of wire used.

Controllers shall meet the following minimum requirements.

A joule rating to deliver a minimum 1,000 volt shock for cattle, 2,000 volt shock for sheep, or 2,500 volt shock for big game, dogs, and coyotes at the farthest point from the controller.

Pulse time duration shall not exceed 0.3 milliseconds.

Lightning arrester.

Safety-pace fuse.

Solid state circuitry (snap-in circuit panels).

High impact weather resistant case.

A 110 volt, 220 volt, or 12-volt battery, power supply.

INSULATORS:

Porcelain ceramic or equivalent insulators will be used in power fences to attach wires to metal or wood posts. All wires shall be insulated to permit switching of hot wires to ground wires and vice versa by switching the power connection and grounding rods.

WIRE TENSION:

Wire tension for all wires in power fences will be no less than 175 pounds per wire. It is desirable to use ratchet strainer devices on each wire to maintain correct tension.

WIRE SPLICING:

All splices will be made with press on sleeves or equivalent line clamps or line taps according to manufacturer recommendations.

Additional Specifications Applicable For Woven Wire Fence with 1, 2, or 3 strands of barbed or barbless wire above the woven wire.

WOVEN WIRE:

Woven wire shall, as a minimum, have a top and bottom wire diameter of eleven (11) gauge with intermediate wire and stay diameter of fourteen and a half (14.5) gauge.

All woven wire shall be new and zinc or aluminum coated.

LINE POSTS:

DIAMETER:

Regular wood posts shall be a minimum nominal diameter of three and a half (3.5) inches inside the bark. Wood posts used for jacklegs shall be a minimum nominal diameter of five (5) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of two (2) inches inside the bark.

Steel posts shall conform to the general specifications for "Line posts, type".

DEPTH IN SOIL:

Depth of line posts in medium to heavy textured soils shall be a minimum of twenty four (24) inches except for steel posts which shall be a minimum of eighteen (18) inches.

Depth of line posts in sandy or gravelly textured soils shall be a minimum of thirty (30) inches except for steel posts which shall be a minimum of twenty four (24) inches.

MAXIMUM SPACING:

Maximum spacing between line posts shall be twenty (20) feet.

CORNER, GATE & BRACE POSTS:

DIAMETER:

Regular wood posts shall be a minimum nominal diameter of five (5) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of four (4) inches inside the bark.

Steel posts shall conform to the general specifications for "Corner, Gate & Brace posts, type".

DEPTH IN SOIL:

Depth of posts in soils shall be a minimum of thirty (30) inches.

MAXIMUM SPACING:

Maximum spacing between brace posts shall be twelve (12) feet.

STAYS: Stays are not applicable to woven wire fences.

JACKLEGS:

Jacklegs shall be designed and constructed according to USDA standard drawings or according to "FENCES, July, 1988, 2400-Range" as needed for site condition and fence duty.

Additional Specifications Applicable For Snow Fence utilizing wooden slats held by double strands of smooth wire.

SNOW FENCE:

Snow fence shall not be used in lieu of other types of fences when livestock or big game control or exclusion is an objective.

Wire strands used in snow fence shall be galvanized with a minimum diameter of fourteen and a half (14.5) gauge, with at least four (4) strands and three (3) or four (4) wire wraps between slats.

Slats used in snow fence shall be painted or treated with an EPA approved method with minimum dimensions of one and a half (1.5) by one and a half (1.5) by forty eight (48) inches. Distance between slats shall not exceed three (3) inches.

LINE POSTS:

DIAMETER:

Regular wood posts shall be a minimum nominal diameter of four (4) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of two and a half (2.5) inches inside the bark.

Steel posts shall conform to the general specifications for "Line posts, type".

DEPTH IN SOIL:

Depth of line posts in medium to heavy textured soils shall be a minimum of twenty four (24) inches except for steel posts which shall be a minimum of eighteen (18) inches.

Depth of line posts in sandy or gravelly textured soils shall be a minimum of thirty (30) inches except for steel posts which shall be a minimum of twenty four (24) inches.

MAXIMUM SPACING:

Maximum spacing between line posts shall be fifteen (15) feet.

CORNER, GATE & BRACE POSTS:

DIAMETER:

Regular wood posts shall be a minimum nominal diameter of eight (8) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of five (5) inches inside the bark.

Steel posts shall conform to the general specifications for "Corner, Gate & Brace posts, type".

DEPTH IN SOIL:

Depth of posts in soils shall be a minimum of thirty six (36) inches.

MAXIMUM SPACING:

Maximum spacing between brace posts shall be twelve (12) feet.

STAYS: Stays are not applicable to snow fences.

STAPLING:

Stapling will not be used in wooden slats of snow fence but may be used on wire strands between slats.

HEIGHT OF FENCE:

Minimum height of forty eight (48) inches. The top wire shall be at least three (3) inches from the top of wooden posts and a least one (1) inch from the top of steel posts.

Additional Specifications Applicable For Combination Snow and Standard Fence when both moisture accumulation and livestock exclusion are needed. (with standard fence on the side facing livestock and snow fence on the opposite side of the posts)

LINE POSTS:

DIAMETER:

Regular wood posts shall be a minimum nominal diameter of four (4) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of two and a half (2.5) inches inside the bark.

Steel posts shall conform to the general specifications for "Line posts, type".

DEPTH IN SOIL:

Depth of line posts in medium to heavy textured soils shall be a minimum of twenty four (24) inches except for steel posts which shall be a minimum of eighteen (18) inches.

Depth of line posts in sandy or gravelly textured soils shall be a minimum of thirty (30) inches except for steel posts which shall be a minimum of twenty four (24) inches.

MAXIMUM SPACING:
Maximum spacing between line posts shall be fifteen (15) feet.

CORNER, GATE & BRACE POSTS:

DIAMETER:
Regular wood posts shall be a minimum nominal diameter of eight (8) inches inside the bark.

Juniper, Osage Orange, or Red Cedar wood posts shall be a minimum nominal diameter of five (5) inches inside the bark.

Steel posts shall conform to the general specifications for "Corner, Gate & Brace posts, type".

DEPTH IN SOIL:

Depth of posts in soils shall be a minimum of thirty six (36) inches.

MAXIMUM SPACING:
Maximum spacing between brace posts shall be twelve (12) feet.

STAYS:
Stays for wire fences shall be of wire especially fabricated for this purpose and swing free of the ground to permit the fence to sway when contacted by animals.

Spacing for stays shall be as needed for site condition and fence duty.

HEIGHT OF FENCE:
Minimum height of forty eight (48) inches for the snow fence and fifty (50) inches for the standard fence. The top wire shall be at least three (3) inches from the top of wooden posts and at least one (1) inch from the top of steel posts.

Additional Specifications Applicable For Buck and Pole Fence with 3 or 4 poles or a combination of poles and barbed or barbless wire.

Bucks shall be formed by mortising and spiking two posts such that they form a cross having an interior angle from 60 to 80 degrees between the legs. The mortise point shall be approximately twelve (12) to sixteen (16) inches from the top of the post. Bucks shall be held in an upright position by two diagonal poles spiked to the legs on one side of the fence. All bucklegs shall be firmly seated in the ground or anchored with rock placed to prevent movement.

Barriers between bucks may consist of three or four horizontal poles spiked to the opposite legs from the diagonal brace poles. Wire may be used in lieu of poles. If wire is used, it shall be stapled to the legs at distances above the ground as set forth for wire fences. A minimum of three wires shall be used.

Buck and Pole designs from other USDA agencies or from "FENCES, July, 1988, publication 2400-Range" may be used, as approved by the responsible technician.

LINE POSTS, SIZE:
Five (5) inches nominal diameter inside the bark.

LINE POSTS, MAXIMUM SPACING:
Maximum spacing between line posts shall be twenty (20) feet.

POLES, SIZE: Three (3) inches nominal diameter inside the bark.

Additional Specifications Applicable For Chain Link Fence or Chain Link Fence with one or more barbed wires above the Chain Link.

For use as protective fence where high-hazard risks need to be reduced (i.e., around waste storage structures, power generators, etc.).

Materials

Wire:

Fabric wire will be a minimum of 12.5 gauge 2-inch mesh, 48 inches high, with zinc coating or equivalent.

Barbed wire shall conform to the general specifications for "Wire, barbed".

Posts:

Line posts shall be galvanized steel with a minimum outside diameter of 1 5/8" and minimum length of 5.5'.

Corner posts shall be galvanized steel with a minimum outside diameter of 2 3/8" and minimum length of 6'.

Gate posts shall be galvanized steel with a minimum diameter and length to support the gate width needed according to the manufacturer's recommendations.

Post spacing: Line posts shall be placed a maximum of 10 feet apart and shall be set in concrete backfill as shown in manufacturer's standard drawings.

Top Rail: Shall be galvanized steel with a minimum outside diameter of 1 5/8".

Gates:

Gates shall be of the size necessary to allow for equipment access.

Gates shall be installed according to manufacturer's recommendations.

Gates may be single-swing or double-swing with the appropriate fittings for latches, stops, hinges, keepers, and other needed accessories. All materials will be steel with zinc coating or equivalent.

Chain link fence accessories:

Caps, rail and brace ends, rail sleeves, wire ties and clips, brace bands, tension bands, tension bars, tension wire, barbed-wire support arms, and other accessories will be of steel and zinc coated as per manufacturer's recommendations. Install lock, latches, or chains where safety is a concern.

Construction

All chain link fences will be constructed according to the manufacturer's standard drawings and specifications and/or completed job sheets.

Additional Specifications Applicable For Corral Fence.

Corral fences shall be according to design specifications included in the "Beef Housing and Equipment Handbook, MWPS-6, ISBN 0-89373-068-8" or according to specific designs approved by the Wyoming NRCS State Conservation Engineer.